

The Cultural Stress Theory of Obesity

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ABSTRACT

The characteristics of modern society contribute to a condition we call Cultural Stress Anxiety Syndrome (CSAS), which is a response to the constant, pervasive, ever-increasing stress of modern living. Cultural Stress often leads to an isolated, sedentary lifestyle and a state of constant anxiety that triggers the body's inflammation response, including the release of stress hormones linked to weight gain. Because Cultural Stress aggravates all other causes of obesity, it must be included in any effective weight management program.

We present a review of the factors implicated in the obesity epidemic, as well as the implications of chronic stress on a variety of health issues. We then outline the evidence for Cultural Stress as a phenomenon that compounds other stressors, as well as the societal factors most responsible for Cultural Stress. We report on an initial pilot study that focuses on Cultural Stress-reduction as part of an inclusive health management program.

We conclude that Cultural Stress is a factor in virtually all of the conditions that contribute to obesity: higher stress hormones, disrupted sleep, sedentary lifestyle, isolation, and reduced self-esteem. Supporting patients in managing Cultural Stress empowers them to effectively reduce their weight and maintain that weight loss over time.

Keywords

Cultural Stress, Psychological stress, Emotional stress, Lifestyle management, Obesity, Overweight.

Introduction

Obesity is a common and costly disorder with significant morbidity and mortality. Despite decades of effort and a multitude of interventions, the global obesity rates continue to climb. According to the Centers for Disease Control (CDC), 71% of adult Americans nationwide were overweight in 2015-16, while nearly 38% of them were obese, regardless of ethnicity [1]. Worldwide, obesity has nearly tripled since 1975 [2]. In April 2020, the World Health Organization (WHO) reported that more than 1.9 billion adults were overweight and more than 650 million of these were obese [2]. WHO also noted that, though obesity was “once considered

a high-income country problem, overweight and obesity are now on the rise in low- and middle-income countries, particularly in urban settings.” And, although WHO explained the obesity phenomenon by means of the basic “energy imbalance” etiology (e.g., more calories ingested than expended), it also acknowledged that “changes in dietary and physical activity patterns are often the result of environmental and societal changes associated with development and lack of supportive policies in sectors such as health, agriculture, transport, urban planning, environment, food processing, distribution, marketing, and education.”

Perhaps even more disturbing, obesity is now affecting the young. The CDC estimates that 19% of American children are obese [1], while in a recent pooled global analysis of nearly 130 million children/adolescents, the prevalence of obesity among girls had

increased from 0.7% in 1975 to 5.6% in 2016, while that among boys had increased from 0.9% in 1975 to 7.8% in 2016 [3-5].

Defined as an excess of body-fat mass and a body mass index (BMI) of 30 kg/m² or more, obesity is considered a chronic disease and is among the most common and costly chronic disorders worldwide, accounting for significant morbidity and mortality [4,5]. Coupled with an increased lifelong risk, those with obesity are at risk for an earlier onset of chronic disorders such as Type 2 diabetes, heart disease, osteoarthritis, dementia, depression, stroke, fatty liver disease, sleep apnea, dyslipidemias, and certain cancers [6,7].

The literature is replete with approaches and guidelines to weight reduction and management, including the barriers and gaps in the approaches to obesity [8-10]. Despite the widespread engagement of individuals and populations in treatment strategies such as exercise programs, diet regimens, and even medical interventions, global obesity rates have not improved [2-5,8,10]. Indeed, they have worsened. Furthermore, the variability in response to various obesity interventions and treatments suggests that obesity is a heterogeneous disease and that person-specific characteristics may be important determinants of the effectiveness of treatments including lifestyle modification, pharmacotherapy, metabolic and bariatric surgery, and medical devices [9,10].

Despite the life-threatening nature of obesity and the failure of many prevention and treatments strategies, the question of “Why are we getting fatter?” remains unanswered. In addition to many well-described causes of obesity as reviewed in the following section, there is also a general consensus that changes in the global food system towards more refined and processed foods and away from whole foods play a role, as does the migration of populations to sprawling megalopolises that require greater reliance on automobiles or mass transit. Sitting, too, has been implicated, with the phrase “Sitting is the new smoking,” becoming a shorthand reference to the long list of diseases attributed to our increasingly sedentary lifestyle [11]. Unfortunately, the trend to longer periods of sitting and fewer periods of movement often begins in childhood and persists into adulthood, priming young people for a lifelong battle with obesity.

The emotional consequences of our increasingly isolated and sedentary lifestyle—in which everything from aspirin to zippers can be delivered—can include loneliness, anxiety, depression, and other disorders. Any one of these can also lead to weight gain, as has been described in the literature regarding emotional eating. Explanations include the use of food to fill an emotional void; the shrinking of social support systems that would help to relieve stress; the retreat from physical exercise that is itself a stress reducer; negative self-talk that can trigger a cycle of bingeing-depression-self-loathing-bingeing; and fluctuating stress-induced cortisol levels [12,13].

Indeed, the early studies that have been done on the effects of the COVID-19 lockdown on mental health, lifestyle changes, and weight show, not surprisingly, that locked-down citizens are

stressed, bored, sedentary, seeking comfort through food, and seeking social connection through devices. For many people, this has led to weight gain [14].

We have coined the term Cultural Stress for this collection of characteristics. These include chronic, pervasive and ever-increasing exposure to technology-mediated living [15-17] and its effects on physical, mental, and emotional health that include anxiety, loneliness, a sense of social isolation, depression, sleep disruption, chronic inflammation, and difficulty controlling weight.

Unfortunately, Cultural Stress has only recently been discussed in the literature, even though stress-related, or emotional eating, is well-documented [12,13,15,16]. Later sections of this manuscript describe the concept of Cultural Stress and its effect on weight gain and obesity (e.g., Cultural Stress Theory of Obesity). We assert that Cultural Stress can be an underlying etiology of obesity, one that limits patients’ ability to lose weight as well as to maintain long-term weight loss. We further assert that much of what the general literature calls “stress,” is actually Cultural Stress, because it is part of the inescapable matrix in which contemporary humans live.

Given our knowledge of Cultural Stress, we propose a greater focus on Cultural Stress as part of the complex etiology of obesity. This may improve our ability to manage and potentially even reverse this global weight crisis. To this end, we designed and performed a pilot study of six women to evaluate how including Cultural Stress as a factor may result in health and wellness benefits including weight loss. The pilot study participants were between the ages of 46 and 53 and completed a 24-week program to reduce a condition that we call Cultural Stress Anxiety Syndrome (CSAS) as well as improve their overall health and wellness, and explore treatments intended to improve genetic expression associated with aging. In general, the 24-week study included the following three-pronged inclusive health approach: external physical care, internal physical care, and emotional care. External care was intended to address innate immunity and strengthen cutaneous defenses to external influences or invaders. Internal care was designed to encourage adaptive immunity. Emotional care was intended to support psychological and social balance. Further details on the methods and findings of this pilot study are contained in a later section of this review.

Review of Obesity Etiologies

Obesity is a chronic disease with a variety of determinants including individual and epigenetic factors (i.e., heritable changes that influence gene expression [18]); environmental, socioeconomic and other variables; and changes that alone and/or in conjunction with yet unidentified etiologies result in weight gain [1,2,19-21]. Unfortunately, it is difficult to determine with any degree of certainty whether these factors predict or precede obesity. Furthermore, this complexity suggests that an individualized approach to obesity as well as its long-term control is warranted [6,9,22,23].

A literature review by Garfinkel-Castro [20] found numerous cross-sectional studies that identified a correlation between the “built” environment (i.e., increased reliance on vehicle transportation versus active modes of travel such as walking/biking) and obesity [21]. Other literature suggests a genetic link to obesity [24]. One theory advances the idea of “thrifty genes” [25], which were advantageous at times in our evolutionary past when food was not plentiful, but that now promote fat deposition in preparation for a famine that never comes. The result is widespread obesity and diabetes. Others have proposed that epigenetic changes, possibly in utero, in childhood, or as the result of aging, triggered by environmental influences, may predispose certain people to fat deposition and work against their efforts to lose weight [18,26]. In a review of epigenetics in the etiology of obesity, Lima and colleagues [18] cited studies suggesting that epigenetic regulation of gene expression (e.g., DNA methylation and histone modifications) may influence obesity and, in addition, that there is evidence that obesity is associated with epigenetic changes.

Eating disorders may also contribute to obesity. In evaluations of potential risk factors for eating disorders, including that of binge-eating, investigators have suggested that changes in intestinal microbiota due to infections, inflammation, or antibacterial medications may contribute to these disorders [27]. Other researchers, such as Himmerich and colleagues [28], in an evaluation of the literature and their genetics-based pathophysiological model of eating disorders—particularly bingeing—suggest that eating disorders can be influenced by environmental and nutritional factors, genetic factors related to the microbiome, the metabolic and endocrine system, the immune system, and the brain. Within the context of the social environment, factors such as socioeconomic status, culture, lifestyle, a certain ideal of beauty, relationships, and psychosocial stressors including academic challenges can impact the emergence of an eating disorder [28].

Many experts, including those who participated in an endocrine society scientific statement on obesity pathogenesis [29], associate the ever-continuing increase in obesity with two related but distinct processes: 1) a sustained positive energy balance (energy intake greater than energy expenditure) and 2) a resetting of the body weight “set point” at an increased value. Beyond this caloric intake and energy expenditure mismatch, there are other environmental factors, including those of socioeconomic status, that impact and may predispose individuals to obesity. Other recent publications have suggested that clinicians undertake a comprehensive diagnostic approach to identify the potential underlying causes of obesity [9,30,31], as summarized in Table 1.

Adults presenting with obesity should be evaluated for lifestyle factors, a detailed past and present medical history, medication use, a global outline of their sociocultural environment, and a thorough physical examination. Modifiable contributing factors such as medications associated with weight-gain, lack of sleep/sleep apnea, chronic stress, and other issues should be optimized or mitigated in order to recommend the best changes for weight-reduction. We concur with the wisdom of this approach, particularly the inclusion of lifestyle factors, to which we would add Cultural Stress.

One of the most widely accepted environmental theories of obesity comes from the “Big Two”: food marketing practices and technology and institution-driven reductions in physical activity [32,33]. We propose that these factors dovetail nicely with the Cultural Stress Theory of Obesity—becoming part of the cultural environment that is stressing inhabitants in maladaptive ways.

There are still other obesity-promoting factors. Some suggest that increases in obesity are due to overconsumption of calories from all sources, including foods with high-fat and/or high sugar

Potential Etiology	Mono-genetic or syndrome		Hypothalamic	Endocrine		Medication	Mental Disorder	Lifestyle
Signs and Symptoms	Young age of onset Hyperphagia Red hair Hypopigmentation Extreme weight difference between family members	Young age of onset Dysmorphic features Developmental delay Autism or Attention deficit disorder Short stature Poly-syndactyly Retinal abnormalities Severe myopia Congenital deafness Nephropathy	Cranial radiotherapy/ head trauma/ surgery Neurological abnormalities Hyperphagia Decreased vision	Acne Hirsutism Irregular menses Acanthosis nigricans Erectile Dysfunction Post-pregnancy Menopause	Bradycardia Muscle weakness Cushingoid features History of radiotherapy or severe head trauma	Weight increase related to initiation or dose increase of a drug with weight gain as a potential adverse effect	Severe repeated binge-eating with or without inadequate compensation behavior Depressive complaints	Unhealthy food intake Lack of exercise Average sleep less than 7 hours Disturbed sleep Snoring/apnea Shift work Alcohol use Stress Smoking cessation Sociocultural background Meal timing Sedentary lifestyle
Potential Diagnosis/ underlying factors	Defect or deficiency: MC4R Leptine (R) Proopiomelanocortin convertase-1	Prader Willi Bardet Biedl Allbright 16p11.2 deletion	Post-radiation therapy Post-surgery Hypothalamic tumor Malformation	Polycystic ovarian syndrome Hypogonadism Post-pregnancy weight retention Menopause	(Cyclic) Cushing’s syndrome Hypothyroidism Growth hormone deficiency	Antidepressants Antipsychotics Anti-epileptics (local) corticosteroids (some) beta-blockers	Binge-eating disorder Bulimia Nervosa Depression Other specified feeding and eating disorders	Hypercaloric intake Lack of exercise Alcohol abuse Nocturnal eating Obstructive sleep apnea Repeated (very) low calorie diets with yo-yo effect

Table 1: Potential Underlying Diseases and Contributing Factors to Weight Gain/Obesity in Adults with Associated Clinical Signs and Symptoms.

content that are good-tasting and low-cost [34-37]. Others argue that sedentary lifestyles both at home and work are factors. Still more suggest that the obesity epidemic is the result of sleep deprivation, endocrine disruptors, a reduction in variability in ambient temperature, decreased smoking, changes in distribution of ethnicity and age, increased gravida age, intrauterine and intergenerational effects, the link between BMI and reproductive fitness and/or genetics, or perhaps because of assortative mating, to name a few [24,31].

Each of these possible factors for the rising rates of obesity seems entirely reasonable. Realistically, the rise in obesity may be the result of an intricate combination of these factors, with each combination being varied or unique to each patient [31]. However, to all of these factors we would add the ubiquity of Cultural Stress, which compounds whatever other factors may be operant.

Noticeably, many of the recent efforts in schools, through the government, at the workplace, and even from food manufacturers who have devised low-cost, low-calorie, high-nutrition, and low-fat foods, have been in vain. The complicated puzzle of obesity has not been solved; otherwise, real long-term results could be obtained for most that simply follow body-fat reduction programs. Unfortunately, studies show that, with respect to body-fat reduction, short-term results are the norm, and long-term maintenance or sustainability is rare [8,10]. If the relationship between energy balance and obesity were a simple cause-and-effect association, then obesity rates should be going down by now. Instead, the exact opposite is true. Why?

Cardiologists Ray Rosenman and Meyer Friedman, who identified the “Type A” personality in 1977, may have offered one of the most compelling clues—and earliest insights into Cultural Stress—with their identification of “hurry sickness,” or the battle against time, which is the chief component sustaining the behavior pattern of those with Type A personalities [38,39]. However, “hurry sickness” was relegated only to those they described as Type A personalities. Twenty-two years later, in 1999, Gliek proposed in a textbook that there was a collective phenomenon at work, which he termed the “age of acceleration,” a culture bent on constantly rushing in order to save milliseconds [40]. He proposed that hurry sickness was not a phenomenon seen only in Type A personalities—a relatively narrow segment of society whose behavior affects their physiology—but a universal response to environmental conditions that appear to demand it. Linking this phenomenon to Cultural Stress, we propose that—in addition to its myriad other causes—obesity is also a symptom of a shared, inescapable response to modern changes to the human experience. Support for this thinking comes from Hill and colleagues [21] who assert that, while biology clearly contributes to individual differences in weight and height, the rapid weight gain that has occurred over the past three decades is a result of the changing environment and how we respond to it.

Relationship Between Stress and Obesity

Hans Selye, who popularized stress as a medical term, defined it

as (or a state resulting in) “the non-specific response of the body to any demand upon it” [41]. Building on Selye’s and others’ work, Goldstein’s research led him to conclude that, “adrenal responses to stress occur in a syndrome that reflects activation of the sympathoadrenal system and hypothalamic–pituitary–adrenocortical (HPA) axis; and a ‘stress syndrome’ maintains homeostasis in emergencies such as ‘fight or flight’ situations. However, if the stress response is excessive or prolonged then any of a variety of clinical disorders can arise” [42]. Goldstein also argued that “the idea of a unitary sympathoadrenal system does not account for evidence that different stressors elicit different patterns of autonomic responses, with exposure to some stressors differentially affecting sympathetic noradrenergic and adrenomedullary hormonal activities. Instead, adrenomedullary responses to stressors are more closely tied to adrenocortical than to sympathetic noradrenergic responses. Distress involves concurrent activation of the HPA and adrenomedullary neuroendocrine systems.” Psychological stress, which is an internal, emotional reaction to stressors that may be internal or external, can induce a prolonged stress response that triggers an adrenocortical response, which is tied to weight gain and obesity. Thus, as ample literature demonstrates, there indeed is a stress-related component to weight gain and obesity [1,3,4,12,16,31]. For example, van der Valk et al., [43] write:

“In our modern society, the obesity pandemic coincides with an increase in factors that enhance cortisol production, such as chronic stress, consumption of food with a high glycemic index, and a reduced amount of sleep. This suggests a vicious circle, where increased glucocorticoid action, obesity, and stress interact and amplify each other. This hypothesis is supported by recent studies demonstrating significant correlations between obesity and long-term cortisol levels, as measured in scalp hair, in both adults and children.”

Other researchers report that psychological stress increases HPA axis dysregulation, which may promote obesity [32,35]. Research also suggests that stress induces unhealthy eating in childhood, perhaps beginning as early as age 8 or 9 years [44], and that stress-eating often continues into adulthood: witness the popularity of “comfort food” after a particularly stressful day. In a conceptual model of the interplay between stressors and obesity, van der Valk and colleagues [43] identified various individual characteristics proposed to play a role in the bidirectional cycle of increased activation of the stress system, increased glucocorticoid action, and obesity. Further studies add a fourth component to the cycle—stress induced by social media and screen time exposure [45,46]. Although this cycle has yet to be broken by most individualized treatment/management strategies, we propose that integrating stress management is key to long-term weight management success. Moreover, we propose that a critical component is targeting management efforts at Cultural Stress.

Cultural Stress: Its Etiology and Effects

We define Cultural Stress as the constant, pervasive stress of modern living. Its chronic nature is what distinguishes it from

conventional stress, which is incident-specific: an accident or injury; a job loss; a divorce; the death of a loved one. The body can respond to conventional stress and repair itself once the stressful incident has passed. Chronic stress doesn't afford bodies this opportunity. When people now say they are "stressed," or they had a stressful day, they are usually referring to Cultural Stress, which like chronic inflammation, has become the matrix in which modern humans live.

Since the global dissemination of the smart phone, cellular networks, and Internet service, technology has been able to invade our lives as never before. People around the world are now digitally connected to each other and to information, goods, and services at any hour of the day or night. Our digital connectivity includes unlimited social media interactions (e.g., Facebook, Instagram, WhatsApp, Twitter, Snapchat, and more), home delivery of goods, services, and entertainment (e.g., Amazon, GrubHub, YouTube, Netflix, Disney, Hulu), a 24-hour news cycle, and constant technology-mediated access to the personal lives of friends, family, and even strangers. While this technology has conferred many benefits, it also has created new forms of stress, which we have termed Cultural Stress. For example, constant comparisons to the lives of others as portrayed on social media have led to an increase in FOMO (fear of missing out), low self-esteem, depression, and even suicide, particularly among adolescents and young adults [46,47]. Constant connectivity has made it more difficult to leave work at the office, infringing on time that is meant to be spent relaxing, rejuvenating, and enjoying relationships with family and friends. As a result, more people of all ages report feeling higher levels of stress than did previous generations. In a survey of nearly 2,000 professionals conducted by business consulting firm Korn Ferry in October 2019, 76% of respondents said that stress at work had had a negative impact on their personal relationships, and 66% say they had lost sleep due to work stress [48]. A small but significant number, 16%, say they've had to quit a job due to stress. The firm reported that employee stress levels in the U.S. have risen nearly 20% in three decades. Among the top reasons for the increased stress over time is the threat of losing a job to technology and the pressure to learn new skills just to stay employed [48].

As noted, the blurring of boundaries between work and rest has also affected sleep. For Americans overall sleep duration has been decreasing since the mid-1980s [49]. Sleep deprivation can have long-term consequences on health: sleepless individuals are more prone to obesity, heart disease, stroke and diabetes [50], as well as mental health problems such as anxiety, unstable moods and even thoughts of suicide. For example, sleep helps regulate cortisol and many other hormones including insulin, which moderates blood sugar levels, ghrelin, which initiates hunger response, and leptin, which provides the sensation of satiation [51-53]. When sleep is disrupted, ghrelin levels increase and leptin levels decrease, increasing hunger signals and downplaying satiety signals.

Sleep loss and subsequent hormonal instability also increase the risk for cardiovascular and endocrine diseases [52,53]. Several publications by McEwen have presented the associations between

sleep deprivation and circadian disruption and the impact of these on stress, increased appetite and increased caloric intake as well as other detrimental pathophysiologic effects [53-55]. Cultural Stress is also likely to indirectly accelerate aging, as studies have shown the detrimental effects that can occur to hormone levels/ imbalances, cells and connective tissue [15-17]. Studies have shown a direct correlation between sleep loss/sleeplessness and telomere shortening [16,56,57]. Another study found a direct relationship between obesity and telomere shortening [58].

The reason most often given for sleep deprivation in adults is stress, or, as we define it, Cultural Stress. Dr. Todd Arnedt, co-director of the University of Michigan Department of Psychiatry and director of its Sleep and Circadian Research Laboratory, told NPR in 2019, "Probably the most common thing I hear from people is that 'I'm not able to shut my mind down at night; my mind is running about what I've got to do the next day'" [59].

According to the 2017 report of the American Psychological Association, "State of the Nation: Stress in America" [60], Americans are stressed about "the future of our nation" (63%), "money" (62%), "work" (61%), "current political climate" (57%), "violence and crime" (51%). These are chronic environmental conditions the body cannot repair and restore. In a 2019 Gallup Poll, 8 in 10 Americans said they were affected by stress: 55% said it was daily; 35% said it was sometimes, while only 17% said they experienced stress seldom, and 4% never [61]. Other surveys have found that, while the factors causing the most stress may differ from year to year—finances, politics, polarization, social media—the upward trajectory remains constant.

Another aspect of Cultural Stress is an unintended consequence of the convenience of having goods and services delivered, which means that people go out less (are more sedentary), and also that they have fewer relationships with their neighbors and fellow citizens: the grocer, the pharmacist, the deli owner, and all the local shopkeepers. As a result, they can feel isolated and alone—no matter how many years they've lived in a neighborhood [62]. Too, the "gig economy," with its replacement of permanent fulltime positions with short-term contract work, or "gigs," often arranged via internet or cell phone, has added to the economic uncertainty many people face. This uncertainty often extends to their home and community life: without secure employment, they cannot make long-term commitments to a home or neighborhood. People who do not feel a meaningful part of their community—in other words, surrounded and supported by relationships of mutual friendship and trust—can suffer loneliness, depression, low self-esteem, and even suicidal ideation, as well as physical health consequences over time [63]. The subsequent reliance on headlines gathered from sensationalist news media can further heighten the sense of isolation, creating the impression of a dangerous and hostile citizenry [64]. This too feeds Cultural Stress levels.

In the last 20 years, email, social media networks, and phone texting have replaced regular in-person communication, maintaining far-flung social networks but, ironically, increasing

our sense of physical isolation. The COVID-19 lockdown has presented a dramatic, large-scale social experiment in the effects of collective social isolation. Increased rates of anxiety, depression, suicide, substance abuse, and domestic violence have been some of the mental health consequences [65,66]. Not coincidentally, many Americans have gained weight during lockdown [67]. Of Americans who calculated the weight gain, 85% reported gaining four or more pounds, while 15% gained less than four pounds. The reasons respondents gave for the weight gain included lack of exercise (72%) and stress eating (70%). Nearly 60% said that both lack of exercise and stress eating were responsible.

Isolation has been shown to have a causal relationship with many diseases. For example, social isolation was associated with slower post-task recovery of systolic blood pressure in men and women, a higher cholesterol response to stress in men, and also with larger cortisol awakening responses and greater cortisol output over the day in both men and women [68]. Higher cortisol levels are known to encourage weight-gain and prevent weight loss.

Cell phone use is also a predominant Cultural Stress factor [69]. Although it helps people stay connected, it also obliterates personal boundaries. Recent studies suggest Americans check their phones an average of 100 to 150 times a day—to check their social media feeds, send a text, or Google a fact. However, it's not just information we're getting, but constant micro-doses of cortisol that activate the sympathetic nervous system, triggering a cascade of chemicals to increase heart rate, pulse and muscle tension, and shunt energy from the brain to the muscles [69]. It can take from five to 30 minutes for hormone levels to normalize again, but in a world where cell phones rarely stop, this seldom happens.

According to researchers Gazzaley and Rosen, the onslaught of our daily (over)exposure to technology has created a relatively new form of anxiety that's all about the need to stay connected [70]. This is symptomatic of Cultural Stress. There are even names for specific forms of cell phone anxiety: Low-Battery Anxiety (panic that can occur when the cell phone battery drops below 20%), Phantom Vibration Syndrome (when you believe your cell phone has vibrated, but it's just your imagination), Nomophobia (fear of being without your phone), and FOMO (fear of missing out) [71].

Preliminary research into the health effects of cell phone use has shown that as little as 50 minutes of use can affect brain glucose metabolism in the region closest to the phone's antenna [72]. As a mode of caution, the study's authors suggest that cell phone use be hands-free (e.g., utilize the speaker or earbuds) and the devices kept away from children.

Unfortunately, most of the Cultural Stress indicators we have described coincide with reduced physical activity and an increasingly sedentary lifestyle. This alone is associated with a number of health risks, including weight gain and obesity.

The combined effects of a more sedentary lifestyle and Cultural Stress include increased isolation, loneliness, anxiety,

sleeplessness/sleep loss, depression, hormone instability, weight-gain/obesity, and risk for chronic diseases such as cardiovascular disorders. As noted, these effects often over-lap and reinforce each other [16]. The Cultural Stress effect of these signs and symptoms may be internalized or may manifest externally, perhaps as a response to environmental situations. A classic example is the anxiety, frustration, and fury that can express itself as "road rage" as a result of driving in congested traffic (which is itself a sedentary and stressful activity) [73,74].

Because Cultural Stress is constant, pervasive, and cumulative, it compounds all other types of stress [16]. It becomes part of the environment, like polluted air or constant noise. For healthcare providers, the recognition of Cultural Stress is a prerequisite to its treatment; however, recognition is difficult as we are all dealing with it [8,16,75,76].

Recognizing Manifestations of Cultural Stress

In our 50 years of experience seeing patients in clinical settings, we noticed the first manifestations of the physical, mental, and emotional effects of Cultural Stress with the digital revolution of the 1980s. As technology and daily life introduced more automated systems, computerized solutions, and home-based services, including home-based work arrangements, Cultural Stress became more ubiquitous. It grew as populations increased, commuting times lengthened, and lifestyles included fewer face-to-face interactions and more device-mediated communications. Undoubtedly, economic upheavals, changing social mores and polarized politics have compounded the effects of Cultural Stress, as have mass media's efforts to induce the population into increased screen-time exposure and chronic information overload. Now we're able to document that the cumulative effects of social media use and screen time exposure are significant and include increased risks for social isolation, anxiety, depression, and obesity [45-47]. Social media has fueled social anxiety, and specifically social appearance anxiety, particularly among teenage girls and young women. The results have included higher rates of depression, eating disorders including binge eating, and suicide [77-84]. Another disturbing trend associated with social media is cyber bullying and hate groups [85].

The effects of Cultural Stress can be recognized even in infants who have presented with health issues as a result of constant traffic noise and air pollution [86,87]. Other stressors of modern living that we include with Cultural Stress are environmental circumstances from which we cannot escape, such as pollution [19,22,86,87], toxic waste, noise, or lack of access to clean drinking water, all of which can cause negative health effects. All of these stressors add to the inevitable acute stresses of living, such as an accident, job loss, death of a loved one, or divorce.

Ironically, our collective efforts to remain more connected through the Internet and social media, while we work more hours, spend more time commuting, and feel as if we can never keep up, have instead made many of us more isolated, more sedentary, and more obese. Similarly, our constant efforts to micro-manage every minute of the day in order to squeeze more efficiency and

productivity from it have imposed significant Cultural Stress on ourselves. The result is a negative self-reinforcing cycle: feeling that we are pressed for time, we exercise less, socialize less, and stress eat more. These behaviors compound the cortisol/weight gain effect, adding to our stress, disrupting our sleep, triggering chronic inflammation, and compromising our immune system. But what if we interrupted this cycle by reducing Cultural Stress?

Review of a Pilot Study Designed to Reduce/Manage CSAS

In our pilot study on Cultural Stress Anxiety Syndrome, participants achieved weight-management success through an inclusive approach that included managing their Cultural Stress [88]. Other researchers have confirmed that all types of stress respond well to a collaborative, multidisciplinary approach that includes boosting cellular health and reducing reactive oxygen species damage [6,9,22,23,89]. Singular interventions or medications may not function long-term to resist cellular damage from external and internal sources. We therefore devised a patient-specific inclusive method of care that incorporated therapies to target all areas where Cultural Stress may cause damage. These included:

- External physical – Health of organs that are in direct contact with the environment: skin, hair, nails and all senses.
- Internal physical – Health of all internal structures, from a single cell to systems of internal organs.
- Mental (including spiritual) health.
- Emotional health.
- Social health.

Diagnostic tests at day one assisted in determining systemic disease such as endocrine system or vascular disorders, so therapeutic, systemic care could be initiated. Therapeutic care during the first week of treatment included nutritional guidance on how to eat a low-acid diet replete with vegetables and fruits, lean meats, and minimally processed foods. Therapeutic care also included formal group physical activity classes two times a week throughout the study and encouraged participants to increase activity at home to counter the cultural trend toward sedentary lifestyles. At the start of the study and each day after, the subjects performed a daily skin care regimen to strengthen the body's dermal defense system and promote an attitude of self-care. The skincare regimen included patient-specific cleansers, treatments and hydration to repair damage and protect and fortify the skin's barrier function and connective tissue from external factors such as UV rays as well as encourage collagen-deposition and -formation. Also on day one of the study, our subjects began taking needs-based prescription medication and supplements including:

- A supplement for restful sleep including chamomile, valerian, lavender, melatonin and GABA.
- Multivitamin and mineral supplement. An iron-free, comprehensive and balanced formula containing all the major vitamins, minerals and trace minerals with antioxidant and anti-inflammatory properties.
- High-potency B complex supplement providing all eight essential B vitamins: thiamine (B1), riboflavin (B2), niacin (B3), pantothenic acid (B5), pyridoxine (B6), folic acid (B9), cyanocobalamin (B12), and biotin (B7).

- Essential fatty acid supplements providing omega-3 fatty acids. This was in the form of fish oil, flaxseed oil, or ground flaxseeds added to food, or in capsule form.
- Lecithin supplement. Soy lecithin granules were sprinkled on or added to foods or added via liquid soy lecithin in capsule form.
- Glucosamine.
- Calcium supplement for bone health between 1000 mg to 1500 mg of calcium with vitamin D daily, depending on the subject's dietary intake of calcium.

The study's emotional care regimen included stress-reducing, muscle-relaxing, and skin rejuvenating spa services such as massage and facials, as well as activities like yoga, support group participation, art classes, positive living lectures, and daily reading of life-affirming Insight Cards. These Insight Cards, a journal, and an explanation of Cultural Stress were given at the beginning of the study and subjects were asked to download an app that delivered daily life-affirming quotes and artwork. The Insight Cards were used as a tool to promote well-being and reduce Cultural Stress. Focused attention to the cards was recommended twice a day and journaling once a day during the entire study.

During the 24-week study, patients completed multiple questionnaires (patient-reported outcomes) including Cohen Perceived Stress Scale, Patient Health Questionnaire (PHQ-9), Murad Cultural Stress Questionnaire, Self-reporting Skin Status Questionnaire, Appearance Questionnaire and video interviews. The body composition analysis (RJL System) included measurements of total body fat, fat-free mass, intracellular water, extracellular water, and total-body water percentages. Blood tests (complete metabolic panel) and blood pressure were monitored too. Standard photographs, VISIA, and Clarity Pro were used to record and analyze visible skin changes. Blood and skin biopsy samples were collected for gene expression analysis using Affymetrix microarrays. All assessments were performed at Baseline, Week 12, and Week 24.

Patients also were given weekly questionnaires and oral interviews, along with journaling daily, to assess their current stress levels. Depending on the stress levels reported and symptoms evidenced, short-term medical interventions were explored and practiced, and discontinued once symptoms reduced enough and general health and cellular immunity improved. Also, patients were instructed in how to avoid Cultural Stress and its resultant CSAS with the following recommendations:

- Determine its sources.
- Once the sources are identified, develop a plan of action to reduce their impact.
- Practice being mindful: Take some time each day to meditate or be quiet and enjoy the simple rhythms of life.
- If you find yourself in a stressful situation—for example, stuck in traffic and late for an appointment—accept the fact that you can't control the situation; however, you can control your response. Try to make the best of it. Why have bad days when you can have a good day?

- Exercise regularly: Go for a walk, practice yoga, or take an exercise class. Being physically active, even for just a few minutes, can make a difference in the way you feel.
- Nourish your body: Avoid the standard American diet. Eat foods that increase the water content in your body—a diet full of whole grains, fresh fruit and vegetables, good fats and proteins. Take a nutritional supplement to fill any gaps in your diet.
- Get a good night's sleep: Americans sleep less than people in any industrialized country in the world. Seven to nine hours of sleep every night are necessary to fully restore the body. Find the time to recharge your body at night so you have the energy to face the challenges that come up every day.

We also encouraged participants in our study to be aware of the mind-body connection and use the Neuro-Immuno-Cutaneous-Endocrine (NICE) network to reduce stress and increase health, bi-directionally [90,91]. This included the use of both mind-relaxing therapies to improve skin conditions and general health and skin-conditioning therapies to improve mind relaxation. Study participants enjoyed a massage and facial every other week. We also taught them mental awareness techniques to rejuvenate the mind. Patients were encouraged to return to a younger, more playful, less worry-prone mentality like that of a toddler and reject, within reason, the social demands and pressures of modern society. Through conscious awareness and intervention in the repetition of negative mental thought patterns, patients reported they were more at ease. While this technique was harder for some than others, often the simple suggestion or permission given from a physician to let go and disconnect started the processes of relaxation and reduction of stress.

Moving the body is also a great Cultural Stress reducer, with benefits to physical health, as well. All six participants met twice a week with a trainer to exercise. They were also encouraged to join support groups, cooking classes, walking clubs, or other activities that engaged them two to three times per week, as well as to sign up for new experiences such as dancing, art, or photography classes. They attended an art therapy class that encouraged coloring outside the lines and laughter. Pet adoption was another suggestion for reducing stress. These activities also confer the benefit of reducing social isolation—a component of Cultural Stress.

Generally, this model of care encompassed interventions aligned with principles of Western medicine, as well as other scientifically supported medical systems and traditions. Specifically, a patient-centric regimen was designed in collaboration with the patient. In order to be successful and lasting, the regimen must be driven by the patient, who must understand and commit to the idea that they have choices and are assuming responsibilities.

As noted, the first step was helping patients identify their leading sources of Cultural Stress. Then we suggested that *the patient* develop a plan of action to reduce the impact from these sources. Through decades of clinical practice we have found that many of our patients live their lives trying—and failing—to live up to some

hypothetical “ideal” that is constantly reinforced by their media consumption. The result of their perfectionism is a sense of failure that can lead to depression and many forms of self-sabotage. A simple intervention, such as a daily reminder to “Be imperfect, live longer,” has helped to circumvent this negative spiral and re-empower patients to take effective action in their own lives. Another approach is to limit or reduce their media consumption.

We recommend that patients who are addicted to their cell phones—checking them constantly for emails, messages, and social media alerts—silence their alerts, disconnect them after a certain hour each evening, and perhaps unplug one day a week to reduce their stress levels.

Also key to effective Cultural Stress management is withdrawing the power the patient ascribes to the outside world and relocating it within themselves. This has been demonstrated in many studies of mindfulness strategies used to reduce stress and improve psychological functioning [92]. Simple awareness practices can lead to a fundamental change in subjects' relationship to their experience (re-perceiving), which leads to changes in self-regulation, values clarification, cognitive and behavioral flexibility. The process enables them to reclaim agency in their own lives, rather than feeling at the effect of the outside world.

Key to the long-term effectiveness of any Cultural Stress/weight loss management program is empowering *patients* to develop the path for themselves. A patient-built path, based on a gradual increase in their own inner resources, is much more likely to lead to sustainable success. We have utilized two simple, low-pressure, high-impact strategies to empower patient decision-making. We do not ask patients to focus on reducing stress, nor on losing weight, but suggest instead that they simply:

- Read the Insight Cards with affirmations twice a day.
- Write in their journal at least once a day.

The goal of reading Insight Cards is to induce positive emotions (e.g., gratitude, optimism, forgiveness, etc.) and productive states of awareness (Figure 1). The journaling is supportive of finding the strength within to appreciate the present moment and make gradual, positive, Cultural Stress-reducing changes in their lives that lead to healthier choices. The challenge is to help patients reframe the reason for their weight and prioritize Cultural Stress management and self-care. We have found that, as patients begin to reclaim a sense of power in their own lives, they become less inclined to eat for emotional reasons; they experience less stress hormone-induced weight gain; they feel more inclined to enjoy the world, exercise, and interact with others, with the result that, soon, a whole cascade of positive effects has been initiated. This, combined with the information and encouragement regarding good nutrition and eating habits and the importance of other good self-care practices, including massage, skincare, and other personal treatments that are physically restorative, reinforce on a physical level the positive internal changes they have initiated. This patient-specific emphasis on internal well-being first—beginning with the management of Cultural Stress—ultimately leads the patient to



Figure 1: Insight Cards and Their Relation to Positive Emotions and Stress-alleviating Awareness.

As a component of an inclusive health method to treatment Cultural Stress, patients are to meditate on positive insight cards that provide life-affirming quotes and statements that encourage gratitude and optimism. Patients are also informed on how to determine, reduce and even avoid Cultural Stress triggers by practicing mindfulness, controlling responses to uncontrollable situations, overcoming negative self-talk, exercising, nourishing the body, and getting quality rest.

direct his or her own weight-management program and achieve success in overcoming non-genetic factors for obesity.

Findings and Implications of CSAS Pilot Study

Although small, our pilot study indicated positive trends in multiple parameters including gene expression, hormonal status, intracellular water content, cellular metabolism, and skin health (reduction in fine lines and wrinkles, UV damage and acne). Based on patient-reported outcomes, Cultural Stress and depression were reduced, and self-confidence increased. Those patients for whom weight was an issue lost weight and felt empowered to maintain this and other improvements—physical, emotional, and mental—in their lives.

Conclusion

Cultural Stress is a factor in virtually all of the conditions that contribute to obesity: higher stress hormones, disrupted sleep, sedentary lifestyle, isolation, and reduced self-esteem, to reiterate a few. It is our experience that supporting patients in managing their Cultural Stress empowers them to effectively reduce their weight and maintain that weight loss over time. At the same time, Cultural Stress management also reduces their risk for other deleterious health consequences that are aggravated by stress. We believe our preliminary findings warrant more study into Cultural Stress and the Cultural Stress Theory of Obesity, in order that we may effectively reduce the morbidity and mortality associated with excess weight.

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